

What is claimed is:

1. An electro-static chucking mechanism for chucking an object electro-statically on a chucking surface, comprising:

    a stage having a dielectric block of which surface is said chucking surface, and a chucking electrode provided in said dielectric block;

    a temperature controller provided with said stage for controlling temperature of said object;

    a chucking power source to apply voltage to said chucking electrode so that said object is chucked;

    wherein,

        said chucking surface has concaves of which openings are shut by said chucked object,

        a heat-exchange gas introduction system that introduces heat-exchange gas into said concaves is provided,

        said concaves include a heat-exchange concave for promoting heat-exchange under increased pressure and a gas-diffusion concave for making said introduced gas diffuse to said heat-exchange concave, and

        said gas-diffusion concave is deeper than said heat-exchange concave.

2. An electro-static chucking mechanism as claimed in claim 1,

wherein

    said gas-diffusion concave is formed in coaxial with the  
    center of said stage.

3. An electro-static chucking mechanism as claimed in claim 1,

wherein;

    depth of said heat-exchange concave is in the range of  
    1 to 20  $\mu$ m.

4. An electro-static chucking mechanism as claimed in claim

1, wherein;

    area of said chucking surface in contact with said  
    chucked object is in the range of 3 to 20 % against surface  
    area of said object facing to said stage.

5. An electro-static chucking mechanism as claimed in claim 1,

wherein;

    cross-sectional area of said gas-diffusion concave  
    along said chucking surface is in the range of 5 to 30 %  
    against surface area of said object facing to said stage.

6. An electro-static chucking mechanism as claimed in claim 1,

wherein;

depth of said gas-diffusion concave is in the range of 50 to 1000  $\mu\text{m}$ .

7. An electro-static chucking mechanism for chucking an object electro-statically on a chucking surface, comprising:

a stage having a dielectric block of which surface is said chucking surface, and a chucking electrode provided in said dielectric block;

a temperature controller provided with said stage for controlling temperature of said object;

a chucking power supply to apply voltage to said chucking electrode to chuck said object;

wherein,

said chucking surface has a concave of which opening is shut by said chucked object,

said stage has a gas introduction channel reaching to said concave,

a gas introduction system that introduces heat-exchange gas into said concave through said gas introduction channel is provided for increasing pressure in said concave,

a lift pin for receiving and passing said object is provided in said gas introduction channel.

8. A surface processing apparatus, comprising:

    a process chamber in which a surface of an object is processed, and

    an electro-static chucking mechanism for chucking said object electro-statically on a chucking surface in said process chamber,

    wherein:

        said mechanism comprises a stage having a dielectric block of which surface is said chucking surface, and a chucking electrode provided in said dielectric block;

        a temperature controller is provided with said stage for controlling temperature of said object;

        a chucking power source to apply voltage to said chucking electrode is provided so that said object is chucked;

        said chucking surface has concaves of which openings are shut by said chucked object;

        a heat-exchange gas introduction system that introduces heat-exchange gas into said concaves is provided;

        said concaves include a heat-exchange concave for promoting heat-exchange under increased pressure and a gas-diffusion concave for making said introduced gas diffuse to said heat-exchange concave; and

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said gas-diffusion concave is deeper than said heat-exchange concave.

9. A surface processing apparatus as claimed in claim 8, wherein said gas-diffusion concave is formed in coaxial with the center of said stage.

10. A surface processing apparatus as claimed in claim 8, wherein;

depth of said heat-exchange concave is in the range of 1 to 20  $\mu$ m.

11. A surface processing apparatus as claimed in claim 8, wherein

area of said chucking surface in contact with said object is in the range of 3 to 20 % against surface area of said object facing to said stage.

12. A surface processing apparatus as claimed in claim 8, wherein

cross-sectional area of said gas-diffusion concave along said chucking surface is in the range of 5 to 30 % of surface area of said object facing to said stage.

13. A surface processing apparatus as claimed in claim 8,

wherein

depth of said gas-diffusion concave is in the range of 50 to 1000  $\mu\text{m}$ .

14. A surface processing apparatus, comprising:

a process chamber in which a surface of an object is processed, and

an electro-static chucking mechanism for chucking said object electro-statically on a chucking surface in said process chamber,

wherein:

said mechanism comprises a stage having a dielectric block of which surface is said chucking surface, and a chucking electrode provided in said dielectric block;

a temperature controller is provided with said stage for controlling temperature of said object;

a chucking power source to apply voltage to said chucking electrode is provided so that said object is chucked;

said chucking surface has a concave of which opening is shut by said chucked object,

said stage has a gas introduction channel reaching to

said concave,

    a gas introduction system that introduces heat-exchange  
gas into said concave through said gas introduction channel  
is provided for increasing pressure in said concave,

    a lift pin for receiving and passing said object is  
provided in said gas introduction channel.